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colour inside

Optical amplifiers – Test methods – Part 1: Power and gain parameters

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OPTICAL AMPLIFIERS – TEST METHODS –

Part 1: Power and gain parameters

FOREWORD

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IEC 61290-1 has been prepared by subcommittee 86C: Fibre optic systems and active devices, of IEC technical committee 86: Fibre optics. It is an International Standard.

This second edition cancels and replaces the first edition published in 2014. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) specification of gain ripple as a new parameter;
b) specification of test method and test report for gain ripple measurements;
c) use of the term “measurement uncertainty” instead of “measurement accuracy”.

The text of this International Standard is based on the following documents:

Draft	Report on voting
86C/1746/FDIS	86C/1783/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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OPTICAL AMPLIFIERS – TEST METHODS –

Part 1: Power and gain parameters

1 Scope ~~and object~~

This part of IEC 61290 applies to all commercially available optical amplifiers (OAs) and optically amplified subsystems. It applies to OAs using optically pumped fibres (optical fibre amplifiers (OFAs) based on either rare-earth doped fibres or on the Raman effect), semiconductors (semiconductor optical amplifiers (SOAs)), and waveguides (planar optical waveguide amplifiers (POWAs)). It is specifically directed to single-channel amplifiers. Test methods for multichannel amplifiers are defined in the IEC 61290-10 series.

This document establishes uniform requirements for accurate and reliable measurements of the following OA parameters, as defined in IEC 61291-1:~~2012~~2018, Clause 3:

a) nominal output signal power;
b) gain;
c) reverse gain;
d) maximum gain;
e) maximum gain wavelength;
f) maximum gain variation with temperature;
g) gain wavelength band;
h) gain wavelength variation;
i) gain stability;
j) polarization-dependent gain;
k) gain ripple (SOA only);
l) large-signal output stability;
m) saturation output power;
n) maximum output signal power;
o) maximum total output power.

NOTE 1 The applicability of the test methods described in this document to distributed Raman amplifiers is still under study.

NOTE 2 All numerical values followed by (‡) are suggested values for which the measurement is assured. Other values are acceptable if verified.

~~The object of this standard is specifically directed to single-channel amplifiers. For multichannel amplifiers, one should refer to the IEC 61290-10 series.~~

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61290-1-1, *Optical amplifiers – Test methods – Part 1-1: Power and gain parameters – Optical spectrum analyzer method*

IEC 61290-1-2, *Optical amplifiers – Test methods – Part 1-2: Power and gain parameters – Electrical spectrum analyzer method*

IEC 61290-1-3, *Optical amplifiers – Test methods – Part 1-3: Power and gain parameters – Optical power meter method*

IEC 61291-1:~~2012~~2018, *Optical amplifiers – Part 1: Generic specification*

IEC 61290-1

Edition 2.0 2022-06

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Optical amplifiers – Test methods – Part 1: Power and gain parameters

Amplificateurs optiques – Méthodes d'essai – Partie 1: Paramètres de puissance et de gain



IEC 61290-1:2022-06(en-fr)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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OPTICAL AMPLIFIERS – TEST METHODS –

Part 1: Power and gain parameters

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OPTICAL AMPLIFIERS – TEST METHODS –

Part 1: Power and gain parameters

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IEC 61291-1:2018, *Optical amplifiers – Part 1: Generic specification*

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

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AMPLIFICATEURS OPTIQUES – MÉTHODES D'ESSAI –

Partie 1: Paramètres de puissance et de gain

AVANT-PROPOS

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Cette deuxième édition annule et remplace la première édition parue en 2014. Cette édition constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

a) spécification de l'ondulation du gain en tant que nouveau paramètre;
b) spécification de la méthode d'essai et du rapport d'essai pour les mesures d'ondulation du gain;
c) utilisation du terme "incertitude de mesure" au lieu de "précision de mesure".

Le texte de cette Norme internationale est issu des documents suivants:

Projet	Rapport de vote
86C/1746/FDIS	86C/1783/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à son approbation.

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Une liste de toutes les parties de la série IEC 61290, publiées sous le titre général *Amplificateurs optiques – Méthodes d'essai*, peut être consultée sur le site web de l'IEC.

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AMPLIFICATEURS OPTIQUES – MÉTHODES D'ESSAI –

Partie 1: Paramètres de puissance et de gain

1 Domaine d'application

La présente partie de l'IEC 61290 s'applique à tous les amplificateurs optiques (AO) et sous-systèmes à amplification optique, disponibles sur le marché. Elle s'applique aux AO utilisant des fibres pompées optiquement (amplificateurs à fibres optiques (AFO) basés sur des fibres dopées aux terres rares ou sur l'effet Raman), des semiconducteurs (amplificateurs optiques à semiconducteurs (SOA)), et des guides d'ondes (amplificateurs à guide d'ondes optiques planaires (POWA)). Elle est spécifiquement centrée sur les amplificateurs à un seul canal. Les méthodes d'essai pour les amplificateurs à canaux multiples sont définies dans la série IEC 61290-10.

Le présent document établit des exigences uniformes pour des mesures précises et fiables des paramètres d'AO donnés ci-dessous, tels qu'ils sont définis dans l'IEC 61291-1:2018, Article 3:

a) puissance nominale du signal de sortie;
b) gain;
c) gain inverse;
d) gain maximal;
e) longueur d'onde du gain maximal;
f) variation maximale du gain en fonction de la température;
g) bande de longueur d'onde du gain;
h) variation du gain en fonction de la longueur d'onde;
i) stabilité du gain;
j) gain dépendant de la polarisation;
k) ondulation du gain (SOA uniquement);
l) stabilité de sortie grands signaux;
m) puissance de sortie en saturation;
n) puissance maximale du signal de sortie;
o) puissance de sortie totale maximale.

NOTE 1 L'applicabilité des méthodes d'essai décrites dans le présent document à des amplificateurs à effet Raman répartis est toujours à l'étude.

NOTE 2 Toutes les valeurs numériques suivies de (‡) sont des valeurs suggérées, pour lesquelles la mesure est assurée. D'autres valeurs sont acceptables, à condition d'être vérifiées.

2 Références normatives

Les documents suivants sont cités dans le texte de sorte qu'ils constituent, pour tout ou partie de leur contenu, des exigences du présent document. Pour les références datées, seule l'édition citée s'applique. Pour les références non datées, la dernière édition du document de référence s'applique (y compris les éventuels amendements).

IEC 61290-1-1, *Amplificateurs optiques – Méthodes d'essai – Partie 1-1: Paramètres de puissance et de gain – Méthode de l'analyseur de spectre optique*

IEC 61290-1-2, *Amplificateurs optiques – Méthodes d'essai – Partie 1-2: Paramètres de puissance et de gain – Méthode de l'analyseur de spectre électrique*

IEC 61290-1-3, *Amplificateurs optiques – Méthodes d'essai – Partie 1-3: Paramètres de puissance et de gain – Méthode par appareil de mesure de la puissance optique*

IEC 61291-1:2018, *Amplificateurs optiques – Partie 1: Spécification générique*